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New distribution records for amphibians and reptiles in eastern Chihuahua, Mexico

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Abstract

Distributions of amphibian and reptile species in northern Mexico are poorly understood when compared to adjacent areas of the southwestern United States. To address this gap in knowledge, we conducted a series of surveys in east-central Chihuahua, Mexico in 2014–2016. We documented 40 new municipality records for amphibian and reptile species by means of high quality digital photos. Photographic surveys offer a low-cost, highly accessible technique for accumulating distributional information.

Key words

Aridland, herpetofauna, northern Mexico, protected areas, surveys.

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Introduction

The distributions of species of herpetofauna are poorly understood in Mexico when compared to the United States and Canada. For example, while the northern Mexican state of Chihuahua has a large and diverse herpetofauna, distributional records for many species in Chihuahua are sparse and patchy. This large state in particular has not experienced intensive collection efforts when compared to adjacent regions (Lemos-Espinal and Smith 2007). This is likely due in large part to the remote and rugged nature of the region and its distance from scientific institutions in Mexico and the United States. This explanation may not be wholly sufficient, though, and despite the close proximity of several U.S. institutions to the borderlands of northern Chihuahua, these areas remain the least surveyed in the state. This may be a result of the perceived danger of fieldwork in the borderlands of northern Mexico, or with perceived difficulties in obtaining collecting permits in Mexico. This situation has left large areas of Chihuahua's border region unexplored and poorly studied (Lemos-Espinal 2015).

The paucity of herpetofaunal distribution records is particularly striking in the northeast corner of Chihuahua. The 2 large municipalities of Ojinaga and Manuel

Benavides sit opposite the Rio Grande from Presidio and Brewster counties in Texas. These 4 adjacent subdivisions are collectively home to Big Bend Ranch State Park and Big Bend National Park (USA), and the Santa Elena Canyon Flora and Fauna Protection Area (Mexico). Together, these 3 protected areas form the proposed Big Bend International Peace Park (King and Wilcox 2008). Despite this proposed transboundary protected status, the well-surveyed Presidio and Brewster counties contrast sharply with the poorly understood municipalities to the south.

To address this gap in our knowledge of herpetofaunal distributions, we organized a series of surveys in this area beginning in 2014. This work has already generated important distribution information, including the first record of the Texas Alligator Lizard (*Gerrhonotus infernalis*) in the state of Chihuahua, and the first documentation of the Trans-Pecos Black-headed Snake (*Tantilla cucullata*) in Mexico (Hernandez et al. 2017, Herr et al. 2017).

In this paper we present a full account of our activities and report 40 new records of amphibians and reptiles within the study area. We established new records at the level of Mexican municipalities. Municipalities are analogous to the U.S. counties that have long been used to delineate new records at a fine geographic scale (Graham et al. 2007, 2009). Furthermore, we demonstrate the ease with which such studies can be conducted by documenting all new records with high quality digital photographs and audio recordings, which are increasingly used as vouchers for distribution records when physical specimens are unavailable (Graham et al. 2010).

Methods

Study area. The municipalities of Ojinaga and Manuel Benavides, Chihuahua (Fig. 1) are located entirely within the Chihuahuan Desert ecoregion. Habitats include Chihuahuan Desert scrub, with shrubs and succulents such as creosote bush (*Larrea tridentata*), whitethorn acacia (*Vachellia constricta*), lechugilla (*Agave lechugilla*), Havard agave (*Agave havardii*), and giant dagger (*Yucca carnerosana*). Arroyos and permanent waterways (including the Rio Grande / Rio Bravo) support a gallery vegetation including desert willow (*Chilopsis linearis*), honey mesquite (*Prosopis glandulosa*), willows (*Salix* spp.), Mexican palo verde (*Parkinsonia aculeata*), tree tobacco (*Nicotiana glauca*), and cottonwoods (*Populus* spp.). An isolated mountain range (Sierra Rica) is present with elevations as high as 2404 m. The Sierra Rica supports oak–pine woodlands with Emory oak (*Quercus emoryi*), Mexican pinyon (*Pinus cembroides*), alligator bark juniper (*Juniperus deppeana*), and an understory of perennial grasses. Finally, an extensive grassland known as Llano Amapolas is present within a small basin along the border of Ojinaga and Manuel Benavides municipalities.

Survey methods. We conducted several surveys in most available habitats within the study areas. Most were visual encounter surveys, consisting of 2–4 researchers walking slowly through habitat, turning cover objects, and searching for amphibians and reptiles. Most specimens were found after turning either rocks or dead agaves, although some were located active on the surface. We also employed road-cruising—driving slowly along paved highways at night looking for live or road-killed amphibians and reptiles. There are few paved roads in the study areas, and therefore road-cruising records were generated primarily along the El Chapo-La Hacienda Highway (Chihuahua-200), a 2-lane paved road originating from the town of Manuel Benavides and running west for 60 km to the intersection with the Ojinaga-Camargo Highway (Chihuahua-67).

Identification and disposition of records. Herpetofauna encountered during surveys was identified to species using published keys and field guides (Lemos-Espinal and Smith 2007, Dixon 2013). All identifications were independently verified by Toby Hibbitts (Texas A&M University, College Station, Texas, USA). Specimens were documented as digital photograph vouchers and accessioned in the Sul Ross State University James F. Scudday Vertebrate Collections (SRSU-D).

Lemos-Espinal and Smith (2007) produced a comprehensive guide to the distribution of Chihuahua's herpetofauna to the municipality level. We consulted that work to verify the record-status of our finds, and conducted further literature searches for any records published subsequently. We used a hand-held GPS unit and the World Topographic Basemap (ESRI) to determine municipality boundaries in the field.

Results

We documented 40 new municipality records over the course of our work: 10 in Ojinaga Municipality and 30 in Manuel Benavides. We present the distribution information for all new records below in systematic order. Nomenclature follows the SSAR standard for common and scientific names (Bonett et al. 2017).

Amphibia: Anura

Anaxyrus debilis (Girard, 1854), Green Toad

New records. First record for Ojinaga Municipality: calling male found at edge of small cattle tank along northern edge of Llano Amapolas (29.0294° N, 104.16239° W; WGS84), Sean P. Graham, Mark W. Herr, and Tomas Hernandez, 16 May 2016 (SRSU-D 38).

First record for Manuel Benavides Municipality: recently metamorphosed individuals found along Playa Bombifrons within Llano Amapolas (29.01779° N, 104.15959° W; WGS84), Sean P. Graham, Mark W. Herr, Tomas Hernandez, and Noah Fields, 21 October 2016 (SRSU-D 61).

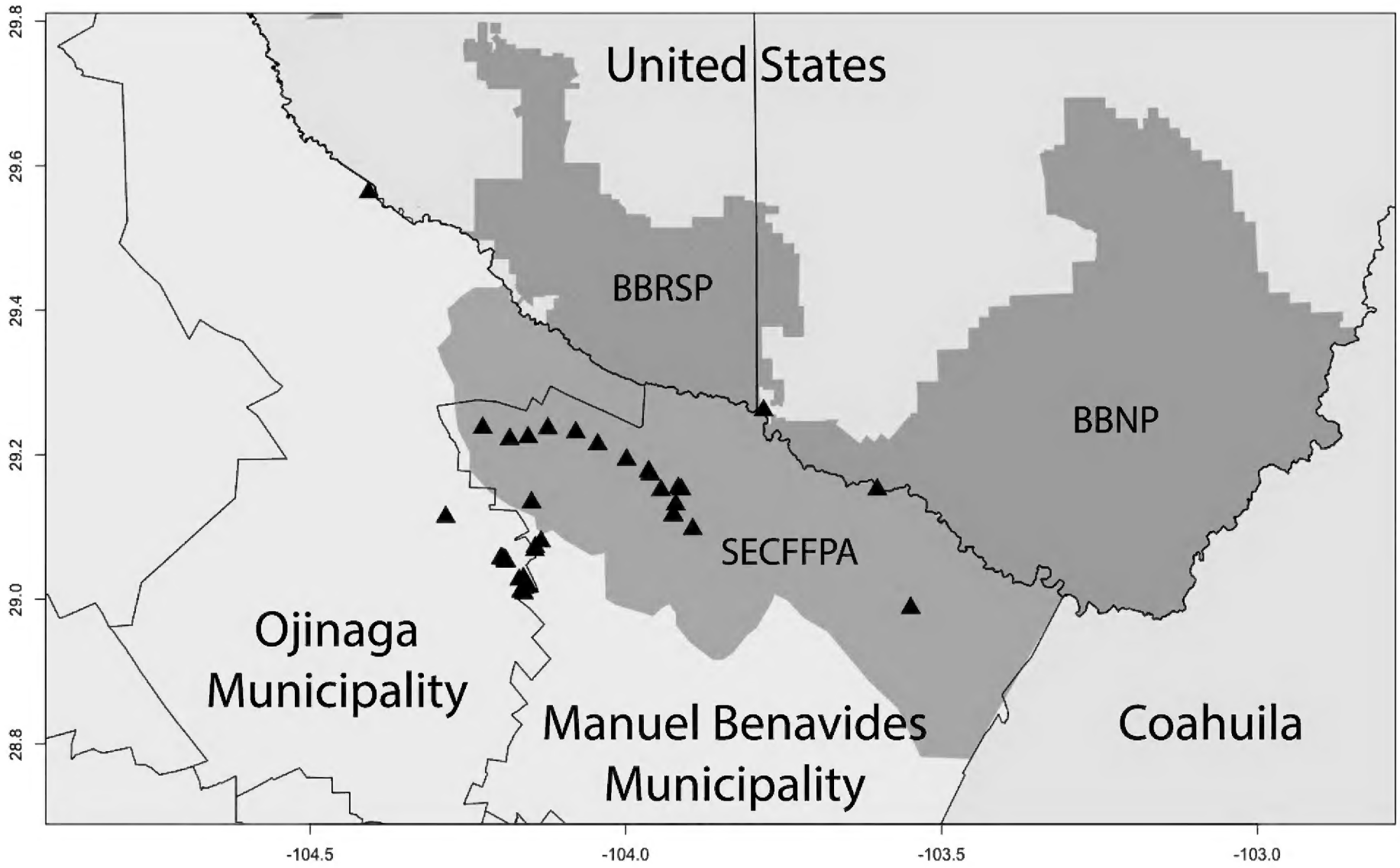

Figure 1. A map of the study area in the Big Bend region. Triangles represent the locations of new municipality records reported in this study. The state of Chihuahua is highlighted in cream and protected areas are shown in green. Abbreviations are BBNP: Big Bend National Park (Texas, USA); BBRSP: Big Bend Ranch State Park (Texas, USA); SECFFPA: Santa Elena Canyon Flora and Fauna Protected Area (Chihuahua, MX).

Anaxyrus punctatus (Baird & Girard, 1852),
Red-spotted Toad

New record. First record for Ojinaga Municipality: Arroyo El Almagre (29.05345° N, 104.18990° W; WGS84), Sean P. Graham, Mark W. Herr, and Tomas Hernandez, 16 May 2016 (SRSU-D 35).

Remarks. SRSU-D 35 depicts a single individual found under a rock; on 21 May 2016 a chorus of several calling males was also observed in a tinaja within the same arroyo.

Gastrophryne olivacea (Hallowell, 1856),
Great Plains Narrow-mouth Toad

New records. First record for Ojinaga Municipality: Arroyo El Almagre (29.05511° N, 104.19182° W; WGS 84), Mark W. Herr, Tomas Hernandez, and Sean P. Graham, 16 May 2016 (SRSU-D 32).

Remarks. SRSU-D 32 depicts a single individual found under a rock; on 21 May 2016 a chorus of several calling males was also observed in a tinaja within the arroyo, and several pairs were discovered in amplexus.

Hyla arenicolor Cope, 1866, Canyon Treefrog

New records. First record for Ojinaga Municipality: recently metamorphosed individual found along Arroyo El Almagre (29.05669° N, 104.19809° W; WGS84), 21 October 2016, Mark W. Herr, Tomas Hernandez, Sean Graham, and Noah Fields (SRSU-D 60).

First record for Manuel Benavides Municipality: several individuals found in Arroyo Salvador in foothills of Sierra Rica (29.13407° N, 104.14945° W; WGS84) 21 October 2016. Sean Graham, Mark W. Herr, Tomas Hernandez, and Noah Fields (SRSU-D 62).

Remarks. There are adjacent records for *H. arenicolor* in Presidio County, Texas (Dixon 2013), however, records for *H. arenicolor* are surprisingly absent from eastern Chihuahua. These records extend this species' range in the state some 200 km east from the nearest populations in the Municipality of Chihuahua (Lemos-Espinal and Smith 2007).

Lithobates berlandieri (Baird, 1859),
Rio Grande Leopard Frog

New records. First record for Manuel Benavides Municipality: juvenile found in irrigation canal (29.116280° N, 103.924692° W; WGS84), 21 May 2014, Tim Warfel, C.J. Vialpando, and Skyler Stevens (SRSU-D 84).

Additional records for Manuel Benavides Municipality: adult found on river bank (29.171000° N, 103.895520° W; WGS84), 18 August 2016, Karlee Cork, Carolina Medina-Nava, and Skyler Stevens (SRSU-D 105). Calling male found near spring (29.113233° N, 103.935620° W; WGS84), 19 August 2016, Karlee Cork, Carolina Medina-Nava, and Skyler Stevens (SRSU-D 97). Tadpoles, egg masses, and recently metamorphosed individuals found throughout Canon San Carlos (29.11380° N 103.93070° W; WGS84) in shallow pools, 20 October 2016, Sean P. Graham, Tomas Hernandez, Noah Fields, and Mark W. Herr (SRSU-D 57-59).

Scaphiopus couchii Baird, 1854, Couch's Spadefoot

New records. First record for Manuel Benavides Municipality: along E–W road across northern edge of Llano Amapolas (29.01691°N, 104.1563°W; WGS84), 16 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 36).

First record for Ojinaga Municipality: Arroyo El Almagre, near Rancho de la Montana ranch house (29.05643°N, 104.19524°W; WGS84), 16 May 2016, Mark W. Herr and Sean P. Graham (SRSU-D 39).

Spea bombifrons (Cope, 1863), Great Plains Spadefoot

New record. First record for Ojinaga Municipality: found calling in cattle tank along E–W road across northern edge of Llano Amapolas (29.02702°N, 104.16879°W; WGS84), 16 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 37).

Remarks. A chorus of about 5–7 calling males heard; 1 was recorded calling and photographed. There are only a handful of records for this explosively-breeding frog from Chihuahua; this record extends the species' range in the state some 200 km from the nearest populations to the west (Municipality of Chihuahua) and southwest (Municipality of Camargo). There are also closer records to the north from Presidio and Brewster County, Texas (Dixon 2013, Graham and Kelehear 2014).

Spea multiplicata (Cope, 1863), New Mexico Spadefoot

New record. First record for Manuel Benavides Municipality: recently metamorphosed individuals found along edge of playa (Playa Falcon) within Llano Amapolas (29.00801°N, 104.16113°W; WGS84), 22 October 2016, Noah Fields, Tomas Hernandez, Mark W. Herr, and Sean Graham (SRSU-D 63-64).

Reptilia: Lacertilia

Aspidoscelis marmorata (Baird & Girard, 1852), Marbled Whiptail

New record. First record for Manuel Benavides Municipality: 2 km SE of mouth of Canyon de Santa Elena on Mexican side of Rio Bravo (29.15196°N, 103.60198°W; WGS84), 17 August 2016, Sean P. Graham, Mark W. Herr, and Laine Giovanetto (SRSU-D 81).

Aspidoscelis tesselata (Say, 1823), Checkered Whiptail

New records. First record for Manuel Benavides Municipality: found in driveway in town of Manuel Benavides (29.116250°N, 103.924502°W; WGS84), 23 May 2014, Tim Warfel, C.J. Vialpando, and Skyler Stevens (SRSU-D 89).

Additional record for Manuel Benavides Municipality: found along Arroyo San Carlos, just E of el ciudad Manuel Benavides (29.09950°N, 103.89651°W; WGS84), 23 October 2016, Sean Graham, Mark W. Herr, Noah Fields, and Tomas Hernandez (SRSU-D 65).

Coleonyx brevis Stejneger, 1893, Texas Banded Gecko

New records. First record for Manuel Benavides Municipality: single individual found under rock alongside road (29.131051°N, 103.920919°W; WGS84), 19 August 2016, Skyler Stevens, Karlee Cork, and Carolina Medina-Nava (SRSU-D 96).

Additional records for Manuel Benavides Municipality: Las Pilas Campground, near Manuel Benavides (29.08469°N, 103.91912°W; WGS84), 5 November 2016, Sean P. Graham and Sul Ross State University Herpetology Class (SRSU-D 67). Three individuals found under boards in village of Santa Elena (29.11336°N, 103.52536°W; WGS84), 7 November 2016, Sean P. Graham, Michelle Lawhorn, Fabiola Baeza, and Lauren Garrett (SRSU-D 80).

Crotaphytus collaris (Say, 1823),
Eastern Collared Lizard

New record. First record for Manuel Benavides Municipality: gravid female found under a rock along edge of Llano Amapolas (29.01916°N, 104.15559°W; WGS84), 17 May 2016, Tomas Hernandez and Mark W. Herr (SRSU-D 41).

Additional records for Manuel Benavides Municipality: Rancho Agua de la Loca (29.02580°N, 104.18374°W; WGS84), 17 May 2016, Sean P. Graham, Mark W. Herr, Tomas Hernandez.

Hemidactylus turcicus (Linnaeus, 1758),
Mediterranean Gecko

New record. First record for Ojinaga Municipality: private residence in city of Ojinaga (29.56299°N, 104.40732°W; WGS84), 22 May 2016, Mark W. Herr, Sean P. Graham, and Tomas Hernandez (SRSU-D 52).

Remarks. This represents only the second known location within Chihuahua for this exotic species (Lemos-Espinal and Smith 2007).

Holbrookia maculata Girard, 1851,
Lesser Earless Lizard

New record. First record for Manuel Benavides Municipality: Llano Amapolas (29.01553°N, 104.16048°W; WGS84), 17 May 2016, Mark W. Herr, Sean P. Graham, and Tomas Hernandez (SRSU-D 40).

Phrynosoma cornutum (Harlan, 1825),
Texas Horned Lizard

New record. First record for Manuel Benavides Municipality: Llano Amapolas (29.01065°N, 104.16605°W; WGS84), 17 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 42).

Phrynosoma modestum Girard, 1852, Round-tailed Horned Lizard

New records. First record for Manuel Benavides Municipality: found along Chihuahua State Highway 200 (El

Chapo-La Hacienda Hwy; 29.17701° N, 103.96393° W; WGS84), 22 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 49).

Additional records for Manuel Benavides Municipality: individual found alongside dead end road approximately 2 km NE of Llano Amapolas (29.03545° N, 104.13763° W; WGS84), 21 October 2016, Noah Fields, Sean P. Graham, Mark W. Herr, Tomas Hernandez. Individual found along road from Llano Amapolas to Rancho de Mr. Franco (29.10468° N, 104.13894° W; WGS84), 21 October 2016, Noah Fields, Sean Graham, Mark W. Herr, and Tomas Hernandez.

Plestiodon obsoletus Baird & Girard, 1852, Great Plains Skink

New records. First record for Ojinaga Municipality: Arroyo El Almagre (29.05216° N, 104.18981° W; WGS84), 16 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 34).

First record for Manuel Benavides Municipality: Rancho de la Madera (29.08007° N, 104.13426° W; WGS84), 19 May 2016, Mark W. Herr, Sean P. Graham, and Tomas Hernandez (SRSU-D 44).

Sceloporus bimaculosus Phelan & Brattstrom, 1955, Twin-spotted Spiny Lizard

New records. First record for Ojinaga Municipality: found along E–W road S of Chihuahua State Highway 200 (29.11409° N, 104.28516° W; WGS84), 22 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 48).

First record for Manuel Benavides Municipality: 500 m SE of Rancho La Victoria, along SE–SW road between Manuel Benavides and Providencia (28.98799° N, 103.54901° W; WGS84), 6 November 2016, Sean P. Graham, Fabiola Baeza, Lauren Garrett, and Michelle Lawhorn (SRSU-D 75).

Additional record for Manuel Benavides Municipality: large adult seen along road between Providencia and Santa Elena (28.92926° N, 103.45056° W; WGS84), 6 November 2016, Sean P. Graham, Fabiola Baeza, Lauren Garrett, and Michelle Lawhorn (SRSU-D 76).

Sceloporus cowlesi Lowe & Norris, 1956, Southwestern Fence Lizard

New record. First record for Manuel Benavides Municipality: found along road from Llano Amapolas to Rancho de Mr. Franco (29.07227° N, 104.14336° W; WGS84), 21 October 2016, Noah Fields, Sean Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 79).

Uta stansburiana Baird & Girard, 1852, Side-blotched Lizard

New records. First record for Manuel Benavides Municipality: found along Arroyo San Carlos, just E of Manuel Benavides town (29.09727° N, 103.89412° W; WGS84), 23 October 2016, (SRSU-D 66).

Additional record for Manuel Benavides Municipality: 2.5 km E of Manuel Benavides along E–W road between Manuel Benavides and Paso de San Antonio (29.09388° N, 103.87389° W; WGS84), 23 October 2016, Sean P. Graham, Noah Fields, Mark W. Herr, and Tomas Hernandez.

Reptilia: Serpentes

Arizona elegans Kennicott, 1859, Glossy Snake

New records. First record for Manuel Benavides Municipality: found DOR along Chihuahua State Highway 200 (29.193330° N, 103.998756° W; WGS84), 3 September 2016, Skyler Stevens, Karlee Cork, and Catherine C. Dennison (SRSU-D 95).

Additional records for Manuel Benavides Municipality: found DOR along Chihuahua State Highway 200 (El Chapo-La Hacienda Hwy; 29.23472° N, 104.21925° W; WGS84), 5 November 2016, Sean P. Graham, Fabiola Baeza, Lauren Garrett, and Dayna Whitmire (SRSU-D 72). Found DOR along Chihuahua State Highway 200 at km marker 47 (El Chapo-La Hacienda Hwy; 29.16819° N, 103.95833° W; WGS84), 5 November 2016, Sean P. Graham, Fabiola Baeza, Lauren Garrett, and Dayna Whitmire (SRSU-D 70-71).

Bogertophis subocularis (Brown, 1901), Trans-Pecos Ratsnake

New records. First record for Manuel Benavides Municipality: juvenile found along Chihuahua State Highway 200 (29.173026° N, 103.961567° W; WGS84), 27 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 90).

Additional records for Manuel Benavides Municipality: Juvenile found along Chihuahua State Highway 200 (29.23346° N, 104.082442° W; WGS84), 27 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 91). Found along Chihuahua State Highway 200 (El Chapo-La Hacienda Hwy; 29.23822° N, 104.11343° W; WGS84), 22 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 51). Found along Chihuahua State Highway 200 (29.249210° N, 104.248010° W; WGS84), 4 September 2016, Skyler Stevens, Karlee Cork, and Catherine C. Dennison (SRSU-D 100). Found AOR on Chihuahua State Highway 200 (El-Chapo-La Hacienda Hwy; 29.23609° N, 103.22309° W; WGS84), 22 October 2016, Noah Fields, Sean P. Graham, Mark W. Herr, and Tomas Hernandez. DOR 5km W of Manuel Benavides on Chihuahua State Highway 200 (El-Chapo-La Hacienda Hwy; 29.14043° N, 103.93116° W; WGS84), 4 November 2016, Sean P. Graham and Herpetology Class.

Coluber taeniatus (Hallowell, 1852), Striped Whipsnake

New record. First record for Manuel Benavides Municipality: found DOR along Chihuahua State Highway 200 (El Chapo-La Hacienda Hwy; 29.22174° N,

104.18390° W; WGS84), 20 October 2016, Tomas Hernandez, Sean P. Graham, Noah Fields, and Mark W. Herr (SRSU-D 53-54).

Crotalus atrox Baird & Girard, 1853,
Western Diamond-backed Rattlesnake

New records. First record for Manuel Benavides Municipality: found along road between towns of Manuel Benavides and Paso de Lajitas (29.152025° N, 103.912174° W; WGS84), 23 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 92).

Additional records for Manuel Benavides Municipality: found along road between towns of Manuel Benavides and Paso de Lajitas (29.152167° N, 103.911972° W; WGS84), 25 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 83). Rancho de la Madera (29.08036° N, 104.13248° W; WGS84), 19 May 2016, Mark W. Herr, Sean P. Graham, and Tomas Hernandez (SRSU-D 43).

Crotalus lepidus Kennicott, 1861, Rock Rattlesnake

New record. First record for Manuel Benavides Municipality: found in ambush position on side of arroyo (29.224173° N, 104.154801° W; WGS84), 27 May 2014, Tim Warfel, Skyler Stevens, and C.J. Vialpando (SRSU-D 85).

Crotalus ornatus Hallowell, 1854,
Eastern Black-tailed Rattlesnake.

New record. First record for Manuel Benavides Municipality: found in ambush position on hillside (29.154051° N, 103.917034° W; WGS84), 25 May 2014, Tim Warfel, C.J. Vialpando, and Skyler Stevens (SRSU-D 86).

Crotalus scutulatus Kennicott, 1861,
Mojave Rattlesnake

New records. First record for Manuel Benavides Municipality: found AOR along Chihuahua State Highway 200 (29.237364° N, 104.226694° W; WGS84), 27 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 82).

Additional records for Manuel Benavides Municipality: found AOR along Chihuahua State Highway 200 (29.261580° N, 104.267580° W; WGS84), 3 September 2016, Skyler Stevens, Karlee Cork, and Catherine C. Dennison (SRSU-D 99). Found AOR 2.5 km NW of Rancho La Victoria, along SE-SW road between Manuel Benavides and Providencia (29.00814° N, 103.56100° W; WGS84), 6 November 2016, Sean P. Graham, Fabiola Baeza, Lauren Garrett, and Michelle Lawhorn (SRSU-D 77-78).

Diadophis punctatus (Linnaeus, 1766),
Ring-necked Snake

New record. First record for Ojinaga Municipality: Arroyo El Almagre (29.05184° N, 104.19055° W; WGS 84), 16 May 2016, Mark W. Herr, Sean P. Graham, and Tomas Hernandez (SRSU-D 33).

Remarks. Records for this species are exceedingly scarce in Chihuahua; most are known from the Barrancas del Cobre region of southwestern Chihuahua and are represented by the subspecies *D. p. dugesii*. This is only the third record for the subspecies *D. p. regalis* in Chihuahua, and represents an approximately 260 km range extension within the state from its closest collection point in the Municipality of Buenaventura. However, a much closer record is known from approximately 65 km to the northeast near Terlingua, Brewster County, Texas (Dixon 2013).

Hypsiglena jani Duges, 1865, Texas Nightsnake

New record. First record for Manuel Benavides Municipality: found AOR along Chihuahua State Highway 200 (29.236649° N, 104.123564° W; WGS84), 22 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 88).

Nerodia erythrogaster (Forster, 1771),
Plain-bellied Watersnake

New record. First record for Manuel Benavides Municipality: found along Rio Bravo at Lajitas (29.26148° N, 103.78193° W; WGS84), 3 October 2015, Ciara Brodie, Sean P. Graham, Alex Pianovich, Amy Pianovich (SRSU-D 30-31).

Remarks. This represents the second record for this species within Chihuahua (Uriarte-Garzon and Garcia-Vazquez, 2014).

Pituophis catenifer (Blainville, 1835), Gophersnake

New records. First record for Manuel Benavides Municipality: found AOR along Chihuahua State Highway 200 (29.150821° N, 103.944452° W; WGS84), 24 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 93).

Additional records for Manuel Benavides Municipality: found DOR along Chihuahua State Highway 200 (El-Chapo-La Hacienda Hwy; 29.25557° N, 104.25715° W; WGS84), 23 October 2016, Sean Graham, Mark W. Herr, Noah Fields, and Tomas Hernandez (SRSU-D 109). Found DOR along Chihuahua State Highway 200 (El-Chapo-La Hacienda Hwy; 29.23897° N, 104.11657° W; WGS84), 5 November 2016, Sean P. Graham and Sul Ross State University Herpetology class (SRSU-D 73-74).

Rhinocheilus lecontei Baird & Girard, 1853,
Long-nosed Snake

New records. First record for Manuel Benavides Municipality: found AOR along Chihuahua State Highway 200 (29.230950° N, 104.079244° W; WGS84), 25 May 2014, Skyler Stevens, Tim Warfel, and C.J. Vialpando (SRSU-D 94).

Additional record for Manuel Benavides Municipality: Found along Chihuahua State Highway 200 (El Chapo-La Hacienda Hwy; 29.05184° N, 104.19055° W;

WGS84), 22 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 50).

Salvadora deserticola Schmidt, 1940,
Desert Patch-nosed Snake

New records. First record for Manuel Benavides Municipality: found along Chihuahua State Highway 200 (El Chapo-La Hacienda Hwy; 29.21440° N, 104.04452° W; WGS84), 20 October 2016, Tomas Hernandez, Sean P. Graham, Mark W. Herr, and Noah Fields (SRSU-D 55-56).

Additional record for Manuel Benavides Municipality: Arroyo El Almagre (29.05473° N, 104.19259° W; WGS84), 22 October 2016, Noah Fields, Mark W. Herr, Sean P. Graham, Tomas Hernandez (SRSU-D 110).

Salvadora grahamiae Baird & Girard, 1853,
Mountain Patch-nosed Snake

New records. First record for Manuel Benavides Municipality: found DOR on Chihuahua State Highway 200 (El Chapo-La Hacienda Hwy; 29.23645° N, 104.12530° W; WGS84), 5 November 2016, Sean P. Graham and Sul Ross State University Herpetology class (SRSU-D 68-69).

Remarks. Only a handful of records exist for this species within Chihuahua, all of which are found in the western half of the state; these records constitute a range extension of approximately 250 km from the nearest record in the Municipality of Namiquipa (Lemos-Espinal and Smith, 2007). However, a much closer record exists approximately 20 km to the north in Big Bend Ranch State Park, Presidio County, Texas (Dixon, 2013).

Tantilla hobartsmithi Taylor, 1937,
Smith's Black-headed Snake

New records. First record for Manuel Benavides Municipality: found in driveway in town of Manuel Benavides (29.116241° N, 103.925014° W; WGS84), 27 May 2014, Skyler Stevens, C.J. Vialpando, and Tim Warfel (SRSU-D 87).

Additional records for Manuel Benavides Municipality: Rancho de la Madera (29.08036° N, 104.13248° W; WGS84), 19 May 2016, Sean P. Graham, Mark W. Herr, and Tomas Hernandez (SRSU-D 45-47). Two individuals found in the foothills of the Sierra Rica adjacent to Arroyo de Mr. Franco (29.13327° N, 104.14875° W; WGS84), 21 October 2016, Sean Graham, Mark W. Herr, Tomas Hernandez, and Noah Fields. Llano Amapolas overlook, along N–S road between Llano Amapolas and Rancho de Mr. Franco (29.05862° N, 104.14314° W; WGS84), 22 October 2016, Noah Fields, Mark W. Herr, Sean P. Graham, Tomas Hernandez.

Remarks. Four *Tantilla hobartsmithi* were found during 2016, all of which were located by turning over dead and decaying *Agave havardii*.

Discussion

In this study, we offer a series of interesting herpetological records, and demonstrate the ease with which such new records can be documented in poorly studied areas of Mexico. Despite the close proximity of this region to the well-studied Big Bend region of Texas, many common species were not formally documented from this region until now. This region of Mexico is home to many species characteristic of the Chihuahuan Desert, and we documented their presence in our surveys. For example, we provide new records for Chihuahuan Desert endemics such as *Bogertophis subocularis*, *Sceloporus bimaculosus*, and *Phrynosoma modestum*.

Over the course of our surveys in these 2 municipalities, we encountered 4 major herpetological assemblages associated with distinctive plant communities and elevational zones: (1) a low-elevation Chihuahuan Desert scrub community, with characteristic species such as *Aspidoscelis marmorata*, *A. tesselata*, *Uta stansburiana*, *Coleonyx brevis*, *Phyrnosoma modestum*, *Sceloporus bimaculosus*, and *Crotalus scutulatus*; (2) a higher-elevation Chihuahuan Desert scrub foothills community, with characteristic species such as *Aspidoscelis scalaris, Plestiodon obsoletus, Sceloporus cowelsi, S. poinsettii, S. merriami, Urosaurus ornatus*, and *Tantilla hobartsmithi*; (3) a riparian community, with characteristic species such as *Hyla arenicolor, Anaxyrus punctatus, Lithobates berlandieri, Gastrophryne olivacea*, and *Diadophis punctatus*; and (4) a grassland community, with characteristic species such as *Aspidoscelis inornatus, Phrynosoma cornutum, Holbrookia maculata*, and *Spea bombifrons*. The presence of this last herpetofaunal assemblage, and the close proximity of Llano Amapolas to the other habitats, makes this region particularly rich in amphibians and reptiles. For example, no extensive grassland occurs within the boundaries of nearby Big Bend National Park (BBNP), Big Bend Ranch State Park, or Black Gap Wildlife Management Area in Texas. Therefore, many of these grassland associates present in the vicinity of Santa Elena Canyon Protected Area (Manuel Benavides municipality) are absent from adjacent preserves in the United States.

Our targeted surveys in the Sierra Rica produced mixed results. Although our survey program previously documented key records for *Gerrhonotus infernalis* (first record for Chihuahua; Hernandez et al. 2017) and *Tantilla cucullata* (first record for Mexico; Herr et al. 2017), we were unable to confirm the presence of *Eleutherodactylus guttilatus*, *Pantherophis bairdii*, and *Lampropeltis alterna*. These species are present in the nearby Chisos Mountains of Texas, and all would represent new state records in Chihuahua (Lemos-Espinal and Smith 2007). A specimen of *Lampropeltis alterna* was recently found in Chihuahua (W. Hansen pers. comm. to MWH) and we await the publication of that record.

Despite reaching similar elevations, the Chisos Mountains and Sierra Rica appear to differ in terms of habitats available. For example, the Chisos Mountains

support high-elevation stands of Ponderosa Pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and Arizona Cypress (*Cupressus arizonica*). Although we reached the summit of the Sierra Rica during the course of our surveys, we did not observe any such high-elevation trees. The Chisos Mountains also support multiple mesic canyons with diverse trees, shrubs, and wildflowers. Although we accessed only one such mesic canyon within the Sierra Rica, other remote canyons were visible from high elevation and merit future exploration.

Traditionally, surveys for reptiles and amphibians have focused on collecting specimens and depositing them in natural history collections. Such specimens offer an unparalleled amount of information to current and future researchers, and collection-based surveys should be pursued whenever possible. Unfortunately, collection-based surveys are often subject to bureaucratic and financial hurdles that can make them impractical. In this study, we document dozens of new distribution records without the need for expensive equipment, or collection and exportation permits. Students, tourists, and citizen-scientists who are unable to collect specimens can still generate and publish relevant distributional information, and we encourage them to do so.

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Authors' Contributions

TH helped in the field, provided critical logistical support, and assisted with manuscript preparation. MWH and SPG wrote and edited the manuscript, designed the study, and helped in the field. SS, KC, CM-N, CJV, TW, NF, and CB helped in the field and provided comments on the manuscript.

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